

Physics Advisory Committee

June 4-8, 2013

CHARGE

After a year long shutdown, the Fermilab accelerator complex is about to restart operations with improved performance for a suite of experiments (MINERvA, MINOS+, a growing NOvA detector, SeaQuest, and a program of testbeam experiments). This accelerator-based program will be enhanced with MicroBooNE (in about 1 year), g-2 (in about 2 years), and eventually mu2e and LBNE. In addition, at every PAC meeting there are new initiatives to consider. ORKA and further SeaQuest running with a polarized beam (contingent upon developing a funding plan) have already received stage-1 approval. NuSTORM has been developed into a full proposal for consideration at this meeting. Other ideas have been presented as LOIs (LAr1 and MiniBooNE+) or EOIs (proton EDM, n-nbar oscillations) in the past, and we can anticipate will eventually be developed into proposals. Furthermore, there is one new LOI and one new EOI at this meeting. In parallel with hosting the domestic accelerator-based program, the laboratory plays a critical role in supporting U.S. contributions to the CMS experiment. The required support is evolving as LHC detector upgrades get under way. Finally, the Cosmic Frontier experimental landscape is also changing with the imminent start of DES, and with the development of LSST, a new wide-field spectroscopic survey, and the next generation dark matter experiments.

In addition to one LOI, one EOI, and one proposal, at this meeting the PAC will hear presentations on the status and plans for the laboratory, the accelerator complex, and the experimental program, including the test beam program, detector R&D, and accelerator R&D. More detailed talks will cover NOvA, LBNE, MicroBooNE, mu2e, the CMS upgrades, and the Cosmic Frontier experiments. Looking at the longer future, there will be presentations on Project X, and laboratory perspectives in the context of the “Snowmass” process.

1. New Initiatives

EOI P-1040: Coherent Elastic Neutrino Nucleus Scattering

LOI P-1039: Drell-Yan experiment with a polarized proton target.

PROPOSAL P-1028: nuSTORM

Given the uncertainty in funding, we ask the PAC to comment and make its recommendations separately under assumptions of (1) no budgetary issues and (2) if the Fermilab budget is

severely constrained over the next four years. For the proposal and the LOI, we ask the PAC to make recommendations and to comment specifically on the following issues:

1. Is the science in the proposal / LOI interesting and/or compelling?
2. Is the technique proposed appropriate for, and likely to be capable of reaching the physics goals of the experiment?
3. What is the competition for reaching the physics goals of the proposed experiment? Does the proposed experiment have particular advantages or disadvantages relative to the competition?
4. What is needed to make such an experiment successful?

For the EOI, we ask the PAC to comment on whether the science goals are compelling, and the scope and appropriateness of the support requested to develop a proposal.

2. Detector R&D and the Testbeam Program

We would value the PAC's comments on the scopes of the detector R&D and testbeam programs, the level of oversight and on progress over the last year. We also ask the PAC to comment on the coherence and completeness of the liquid argon detector R&D program.

3. Specific Experiments: NOvA, mu2e, MicroBooNE, and LBNE

For each experiment, we ask the PAC to comment on the current situation and on the progress being made.

4. CMS

The U.S. contributions to the CMS upgrade continue to be better defined and developed. We ask the PAC to comment on the proposed contributions, and what will be needed from the laboratory to make the upgrade successful.

5. Cosmic Frontier

The DES collaboration anticipates their survey will start later this year. The roles of Fermilab in the next-generation surveys (a wide-field spectroscopic survey and LSST) are being explored. The PAC is asked to comment on the present situation, and on plans and progress towards Fermilab participation in the future surveys.

The laboratory is involved in three Dark Matter experiments (CDMS, COUPP, and DarkSide), and is supporting R&D towards the associated candidate Generation-2 experiments. The PAC is asked to comment on the present situation, and on progress towards developing competitive Generation-2 experiment proposals.

6. Project X and Snowmass

Project X lies at the center of the laboratories long-term plans to excel at the intensity frontier. It is important that the physics case is well developed and articulated, and that there is effective outreach to the community. We ask the PAC to comment on progress in developing and communicating the Project X plans and physics case.

The upcoming “Snowmass on the Mississippi” meeting is designed to develop the long-term physics aspirations of the U.S. high energy physics community. It is important that the laboratories long-term vision is well articulated at this meeting. We ask the PAC to comment on the vision, and the way in which it is presently being presented to the community.

7. Other

Finally, there will be a number of additional presentations about Laboratory efforts. The topics covered include accelerator R&D and IARC. We would welcome any comments the PAC has on any of the topics presented.